# Cleaner Shoe Production at Valeo in Bulgaria



**Project Title**: Cleaner Shoe Production: Environmental Friendly Products
**Leader:** Valeo Company, Bulgaria
**Partner:** BEM Systems, Inc. (New Jersey, USA)
**Location:** Plovdiv and Sopot, Bulgaria
**Project Duration:** May 2001 – January 2002
**EcoLinks Project Investment:** Total Project Investment: $ 72,500; EcoLinks Grant Support: $50,000; Project Team Cost Share Contribution: $22,500

## Best Practice: Transferable Solution

Valeo, a sports shoes and accessories manufacturer in Bulgaria, demonstrates in this Best Practice a successful methodology for reducing the emission of volatile organic compounds (VOCs). With the support of an EcoLinks Challenge Grant, Valeo partnered with an American firm called BEM Systems to design a Cleaner Production program for reducing the environmental impacts of shoe manufacturing. With a clear implementation plan, Valeo then contributed $12,000 of its own funds to follow through on making important improvements to reduce VOC emissions.

## Project Summary

Valeo produces and exports approximately 2,200,000 pairs of quality sports and utility footwear each year at its four production sites: Plovdiv, Sopot, Gotse Delcev, and Dupnitsa. In manufacturing this vast quantity of shoes, Valeo was experiencing a number of environmental problems including uncontrolled VOC emissions and insufficient management of volatile raw and waste materials. Approximately 60 tons of VOCs per year were being released from three of Valeo's four production sites. It used two times as much glue, solvent, and cleaning product per shoe produced compared to similar manufacturers in the European Union. While environmental

management was improving at Valeo, several improvements still needed to be made especially in order to comply with new environmental legislation in Bulgaria.

With the support of an EcoLinks Challenge Grant, Valeo collaborated with a US partner, BEM Systems, Inc. to develop and implement ways to improve the environmental performance of shoe production at several of the Valeo production sites. An assessment was conducted regarding production and product quality issues, VOC production, and the handling of hazardous materials. Alternatives to reduce VOC emissions were developed and implemented. Several hundred employees at Valeo and other shoe manufacturing facilities in the region were trained on how to improve procedures regarding the handling of hazardous materials.

At the end of the project, VOC emissions were already reduced by 14% with additional reductions anticipated. With implementation of the proposed changes regarding the ventilation system, for example, VOC emissions will be reduced by 40 %. The project set targets for an additional 35% reduction in VOC emissions by the year 2007 when the company expects to use the same quantity of glues and solvents per pair of shoes as EU manufacturers.

With implementation of the proposed measures developed by the project, the use of glues, solvents and cleaning agents are also reduced significantly to generate important environmental and economic benefits. At Valeo in Plovdiv, for example, implementation of the proposed program reduces the use of solvents by 50% and the consumption of cleaning agents by 20%. Due to the reduced consumption of glues and solvents, Valeo generates savings in raw material purchases as well as avoided penalty costs associated with non-compliance of new regulations. Valeo can save up to $21,000 per year by implementing cleaner production strategies as outlined by this project.

# Project Activities

This project involved a series of activities including conducting an assessment of the current environmental situation at the sites , developing alternatives for Cleaner Production, evaluating the alternatives in term of both environmental and economic considerations, and developing guidelines for improvements, all of which culminated in the development and initiation of a sound Implementation Plan.

**1. Conducted a preliminary assessment of Valeo.**

Action: An assessment of Valeo was conducted at multiple sites of the company including Plovdiv, Sopot, Gotze Delchev, and Dupnitza. The assessment reviewed the following items:

- Production process
- Use of volatile materials (e.g., adhesives, solvents, etc.)
- Product quality (at the intermediate and final stages of production)
- Handling of stored materials
- Air quality, including emissions (especially VOC emissions)
- Availability of treatment facilities

- Documentation practices

The results of assessing air and water quality and waste production were reviewed and compared with Bulgarian environmental standards. In the event that Bulgarian standards were not yet established (e.g., VOC regulations, documentation procedures, etc.), EU and US standards were applied.

The assessment revealed the quantities and main sources of VOC emissions at Valeo. Gotze Delchev released the highest amount of VOCs at 36% of the total share of VOC emissions for all of Valeo. The least polluting site was Sopot that produced only 26.1%. It was discovered, furthermore, that 85% of the VOC emissions at each site resulted from the use of X Glues.

Product(s): 1) Data on air and water quality and waste production at Valeo 2) Evaluation of air, water, and waste data.

**2. Established alternatives for cleaner production.**

Action: Based on the data collected and evaluated in Activity 1, the EcoLinks project team developed alternative strategies for improving environmental and operation practices at Valeo. The goal was to establish alternatives that would allow for full compliance with pending Bulgarian environmental standards (to be enforced in the next two years). The alternatives included the following:

1. Substitution of certain materials (i.e., adhesives and solvents);
2. Addition of treatment and control equipment;
3. Technological improvements in "hot spots";
4. Optimization of operations; and
5. Combination of Alternative 4 and one other preceding alternative (1-3).

BEM Systems Inc. focused especially on developing alternatives to using the adhesive X Glue and the solvent Poliscarpe. A total of 17 alternative adhesives and eight alternative solvents were considered.

Product(s): Alternatives for Cleaner Production

**3. Conducted an environmental evaluation and a cost benefit analysis of each alternative and developed recommendations.**

Action: Each alternative was evaluated in terms of environmental impacts and costs using the following criteria:

- Improved worker health and safety.
- Maintenance of production in view of pending Bulgarian environmental legislation.
- Degree of impact on Valeo facilities in relation to the future permitting system.
- Possibilities for implementing Cleaner Production Best Practices without jeopardizing product quality.
- Sufficient funding opportunities.

- Ease with which each alternative could be implemented (i.e., time requirements).

The challenges associated with upcoming Bulgarian regulations were identified. They included the introduction of taxes, penalties avoidance, and minimizing waste such as leather parts and hazardous solvents and glues. Risk assumptions were evaluated. The maintenance of product quality was considered regarding the application of substitutes for hazardous adhesives and solvents. Given that the technological equipment at Valeo is not old or physically deteriorated, the purchase of replacement technology was given low priority for financial reasons. Some procedural improvements, such as leather cutting, were highly feasible and given great consideration.

Based on the environmental and economic analysis of the proposed alternatives, the following recommendations were made:

1) Substitution of glues, solvents, and cleaning agents with more environmentally sound alternatives.
2) Purchase of equipment (i.e., freezing machine) for eliminating vapors and spills of hazardous materials to be used in all workspaces where glues and solvents are used.
3) Installation of a cleaning system for an extraction ventilation system.
4) Reduction of leather waste through improved cutting approaches.

Product(s): 1) Environmental and cost benefit analyses 2) Report on project activities 3) Recommendations 4) Data sheets on environmentally sound and cost effective glues and solvents

**4. Established an implementation program.**

Action: Long-term and short-term implementation tasks were established. Proposed measures were developed and assessed with special attention paid to the impacts of each measure on emissions reductions. Valeo purchased an environmentally friendly machine for reducing fumes associated with glue operations. The installation of a ventilation/extraction system was initiated. The X Glues were substituted with Be Be Bond glue which is less hazardous in terms of VOC production, yet still sustains the quality of the product.

An outline of the Implementation Plan is as follows:

| **Measures** | **Deadline** | **Costs and Sources of Financing Implementation Phase** |
|---|---|---|
| **Short-term measures** | | |
| *Organizational Measures* | | |
| 1. Review of the technological process and identification of technological measures. | During the implementation of the project. | No cost<br>Completed in October 2001. |
| 2. Elimination of | During the implementation | No cost |

| | | |
|---|---|---|
| organizational weaknesses leading to increased emissions. | of the project. | Completed in November 2001. In December new material usage norms were developed. |
| 3. Enlargement of the scope of the annual prophylactic measures. | In the beginning of each year. | No cost<br>Identification of VOC-related sicknesses. |
| *Investment measures* | | |
| 1. Improvement of local ventilation in Plovdiv. | Until the completion of the project. | $5,000 - from EcoLinks;<br>$1,000 - self-financing. |
| 2. Review of local ventilation on Sopot and G. Delchev sites. | Until the end of 2002. | $2,000 - self-financing. |
| 3. Preparation of ventilation equipment retrofit, similar to Plovdid, for the other two sites Sopot and G. Delchev. | Until the end of 2003. | $10,000 - self-financing. |
| **Mid-term measures** | | |
| 1. Purchase and mounting of more environmental friendly equipment for sole pressing. | 2004. | $100,000 - bank loan. |
| 2. Research and introduction of new glues to other sites. | Until end October 2005. | $10,000 - self-financing. |
| 3. Identification of spots for monitoring the air quality. | Until end October 2005. | $5,000 - self-financing;<br>Monitoring will be done by a licensed laboratory. |
| **Long-term measures** | | |
| 1. Introduction of new glues to further reduce emissions. | Until end October 2007. | $3,000 - bank loan. |
| 2. Introduction of self-monitoring of VOC emissions. | Until end October 2007. | $20,000 - bank loan.<br>Automatic measurement devices will be used. |
| 3. Research and implementation of methods for efficient usage of VOC gases. | 2007. | $80,000 - bank loan. |

Product(s): 1) Implementation Plan 2) Purchase of environmentally friendly machine for glue operations 3) Initiation of the installation of a ventilation/extraction system.

**5. Developed guidelines for cleaner shoe production.**

Action: Based on the information gathered throughout the project, seminar materials and handouts on cleaner shoe production guidelines were prepared including information on how to handle hazardous materials such as glues and solvents. Materials were disseminated to more than 400 employees in the shoe production

branch. Valeo employees were presented with some of the Best Practices including: Log Out Tag Out (LOTO); Spill Prevention Control and Countermeasures (SPPC), and Hazardous Material Spill and Leak Response.

Each Best Practice promoted significant improvements. The Lock Out Tag Out Program (LOTO) was developed to protect employees from accidents and injuries caused by accidental start-ups or release of energy by equipment during maintenance operations. The Spill Prevention Control and Countermeasures (SPPC) Plan includes general facility information, definitions of key SPPC terms, an applicability section including a regulatory framework, a description of existing storage facilities for petroleum and hazardous materials, and a spill history and security outline. A section on procedures describes spill control measures, transfer and dispensing operations, and standard operating procedures. The Hazardous Material Spill and Leak Response Program handout describes actions that employees (including supervisors, maintenance workers, custodial workers, police officers, and other persons designated to manage and clean up spills) should take in the event that they are exposed to chemical and biological hazards from incidental hazardous material spills and leaks.

Product(s): Production and dissemination of materials on handling of hazardous materials including Log Out Tag Out; Spill Prevention Control and Countermeasures Handbook, and Hazardous Material Spill and Leak Response.

**6. Conducted Training Seminars.**

Several seminars were conducted involving more than 300 Valeo employees. Employees were trained through seminars on:

- Relevant production issues;
- Capacity to implement the proposed measures developed by the project;
- New environmental legislation; and
- Handling and operations regarding hazardous materials.

Product(s): Several short on-site seminars involving 300 employee participants.

# Project Benefits

There are several benefits generated by this project. Hundreds of Valeo employees are now trained in more environmentally friendly procedures for handling hazardous materials associated with footwear production. VOC emissions are now managed more effectively and less hazardous glue, solvent, and cleaning agent substitutes are being used where possible. Worker safety has been improved due to improved working conditions. Savings have been generated from improving the efficiency of footwear production.

**Capacity Building Benefits**

Due to the trainings and outreach efforts that were conducted as part of this project, four hundred employees from several shoe manufacturers were trained in environmental management practices. With the strengthening of skills and experience

amongst Valeo employees, Valeo production facilities are implementing a Cleaner Production methodology. Employee awareness has been raised through the multiple seminars on the handling of hazardous materials. Accidents involving hazardous materials will be handled more safely reducing detrimental impacts on worker health and safety.

Through the transfer of know-how from the US partner (BEM Systems), Valeo learned how to evaluate and improve the current environmental situation at its four facilities. With this knowledge, Valeo could start implementing organizational and process changes by applying no-cost and low-cost measures that reduce VOC emissions and improve the cost effectiveness of the manufacturing process. Through this project, Valeo furthermore became more aware of the benefits of obtaining ISO 14 001 certification and started preliminary preparations towards achieving this.

**Environmental Benefits**

Implementation efforts developed as part of this EcoLinks project bring Valeo into compliance with Bulgarian environmental and health and safety regulations (both current and proposed). New equipment and cleaner production approaches reduce both the use and emission of volatile substances used in the shoe production process.

With the purchase of new equipment (i.e., freezing machine, especially useful for operations involving glue and solvent usage) and the installation of a new ventilation system in several Valeo shops in Plovdiv, Valeo reduces VOC emissions significantly. With a new freezing machine for the glue application process, for example, VOC emissions were reduced by 70%. Additionally, the use of solvents at Valeo in Plovdiv has been reduced by 50%, and the consumption of cleaning agents has been reduced by 20%.

For the entire Company, VOC emissions are reduced by a total 14.1% annually. Total annual VOC emissions from the Plovdiv site are reduced by 15.5%. The total annual reduction in VOC emissions from glues at the Gotse Delchev site is 11.6%. At the Sopot site, VOC emissions are reduced by 10.8% per year.

**Economic Benefits**

This project not only provides significant environmental benefits but also generates notable economic benefits. In addition to improving Valeo's market competitiveness that can increase the Company's revenues, this project generates a good return on improvement investments and allows the Company to avoid costly waste disposal and non-compliance charges.

With implementation of a Cleaner Production strategy, the purchase of the freezing machine, and a reduction in certain waste management charges, Valeo saves a total of $64,000 per year. Through a more efficient and environmental approach to shoe production, Valeo saves $21,000 per year. The cost of manufacturing shoes was reduced most notably by decreasing the quantity of glue used per shoe by 12.5%, solvents by 50%, and cleaning substances by 20%. Valeo purchased a freezing machine for the Plovdiv site in the amount of $12,000 during project implementation. In addition to reducing VOC emissions by 70% in the area where glues are used, the

economic benefit generated from this investment is about $42,000 per year. An additional $1,000 per year is saved by avoiding charges paid to the waste management company for the discharge of X Glue packaging boxes.

# Lessons Learned

The following lessons were learned during this project:

- Given that practices to limit VOCs are not yet in place in Bulgaria, it was helpful to learn about US practices to limit VOC emissions.
- In the event that certain equipment is not available as planned, alternatives might be sought. For example, the US partner was not able to bring VOC measuring equipment. Thus, an alternative available in Bulgaria, the Balance Method Emission Assessment (an EU method), was used.
- By implementing the Cleaner Production measures sooner than the 2007 deadline for Bulgaria's regulatory introduction of Directive 1999/13/EU, the company could immediately gain a competitive edge in the European and world market.
- Commitment goes a long way in making a project successful. Valeo is committed to achieving Cleaner Production standards and contributed $12,000 of its own funds to the implementation phase outlined by this project.

# Contact Information

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